

IN THE CLAIMS:

The following listing reflects the current version of all claims, and replaces all earlier versions and listings:

1. (Original) A semiconductor apparatus provided with at least one set of buried channel type first conductive type MOS transistor and surface channel type first conductive type MOS transistor on the same substrate, wherein a first conductive type impurity region is provided below a gate electrode of said buried channel type and surface channel type MOS transistors and between source and drain regions.

2. (Original) A solid state image pickup device comprising a pixel having a photoelectric conversion portion and a plurality of transistors formed in correspondence to said photoelectric conversion portion, on a substrate, wherein said plurality of transistors include a buried channel type first conductive type MOS transistor and a surface channel type first conductive type MOS transistor, and a first conductive type impurity region is provided below a gate electrode and between source and drain regions of said buried channel type and surface channel type MOS transistors.

3. (Original) A solid state image pickup device as claimed in claim 2, wherein said plurality of transistors include an amplifier transistor amplifying a signal from said photoelectric conversion portion, and said amplifier transistor is constituted by said buried channel type MOS transistor.

4. (Original) A solid state image pickup device as claimed in claim 2, wherein said surface channel type MOS transistor has a second conductive type semiconductor region in a side closer to a substrate surface than said first conductive type semiconductor region.

5. (Original) A solid state image pickup device as claimed in claim 4, wherein a doze amount of said first conductive type semiconductor region is smaller than a doze amount of said second conductive type semiconductor region.

6. (Original) A solid state image pickup device as claimed in claim 3, wherein said amplifier transistor is constituted by a source follower MOS transistor forming an output stage of said pixel portion.

7. (Original) A solid state image pickup device as claimed in claim 2, wherein a gate electrode of said buried channel type MOS transistor is made of a poly-silicon in which an impurity of a second conductive type opposite to said first conductive type is injected, and a gate electrode of said surface channel type MOS transistor is made of a poly-silicon in which the first conductive type impurity is injected.

8. (Original) A solid state image pickup device as claimed in claim 2, wherein said first conductive type semiconductor regions of said buried channel type MOS transistor and the surface channel type MOS transistor have the same density profile.

9. (Original) A solid state image pickup device as claimed in claim 2, wherein said first conductive type semiconductor region is formed in the same step.

10. (Original) An image pickup system comprising:
an image forming optical system forming an image from a light from an object;
the solid state image pickup device as claimed in claim 2 for converting the formed image in a photoelectrical manner; and
a signal processing circuit for digitally converting and an output signal from the solid state image pickup device.

11. (New) A method of manufacturing a semiconductor apparatus provided with both a buried channel type first conductive type MOS transistor and a surface channel type first conductive type MOS transistor, wherein a first conductive type impurity region is formed in channel positions of said buried channel type and surface channel type MOS transistors in the same step.

12. (New) A method of manufacturing a solid state image pickup device having a photoelectric conversion portion and a pixel including a plurality of transistors formed in correspondence to said photoelectric conversion portion, in a substrate, wherein said plurality of transistors includes a buried channel type first conductive type MOS transistor and a surface channel type first conductive type MOS transistor, and a first

conductive type impurity region is formed in channel positions of said buried channel type and surface channel type MOS transistors.

13. (New) A method of manufacturing a solid state image pickup device as claimed in claim 12, wherein a second conductive type impurity region is formed in the channel region of said surface channel type MOS transistor.

14. (New) A method of manufacturing a solid state image pickup device as claimed in claim 13, wherein a dose amount of said first conductive type channel dope layer is smaller than a dose amount of said second conductive type channel dope layer.

15. (New) A method of manufacturing a solid state image pickup device as claimed in any one of claims 12 to 14, wherein said first conductive type is of an n-type.

16. (New) A method of manufacturing a solid state image pickup device as claimed in claim 15, wherein an arsenic is used as a dopant of the first conductive type channel dope layer.